Edwards Aquifer and Desalination

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Texas groundwater districts are grappling with the difficult task of meeting mounting demands and preserving long-term supplies even as the recent *Bragg* decision has cast uncertainty over their regulatory authority.

With luck, emerging strategies could help to reduce water usage and expand potential sources. Earlier this year, the legislature passed a bill to promote research that could make two particular strategies – desalination of brackish groundwater and aquifer storage and recovery – more viable in the Edwards Aquifer.

Brackish Groundwater

The Texas Water Development Board first formally identified brackish groundwater desalination as a supply strategy in the 2007 State Water Plan, though by that point more 80 desalination plants were already operating around the state. (For general background on brackish groundwater in Texas, see this issue brief from the Living Waters Project.) The 2012 State Water Plan projects that brackish groundwater will account for about 11 percent of total supplies by 2060. The City of San Antonio, for instance, wants to reduce its reliance on the Edwards Aquifer by tapping into brackish water in the Wilcox Aquifer.

Texas has about 2.7 billion acre-feet of brackish groundwater, which is more saline than freshwater but less than seawater. Although desalinating brackish water is an expensive and energy-intensive process, UT's Michael Weber has predicted that depleting freshwater sources will cause water costs to increase at the same time that improving technologies (especially reverse osmosis) will bring down desalination costs. Ultimately, the costs of desalinated water and freshwater will converge.

Aquifer Storage and Recovery

The EPA defines aquifer storage and recovery (ASR) as "the enhancement of natural ground water supplies using man-made conveyances such as infiltration basins or injection wells … with the purpose of both augmenting ground water resources and recovering the water in the future for various uses."

ASR can hold water for later use, much like a reservoir, and can be supplied with reclaimed water, surface water or groundwater. But ASR offers advantages over traditional reservoirs in that it has fewer environmental impacts, does not require the acquisition and flooding of land and reduces water loss. (West of the 100th meridian, for instance, traditional reservoirs generally lose more water to evapotranspiration than they receive from precipitation.)

Texas has developed relatively little ASR capacity, however, compared to other large water-stressed states like California and Florida. The greatest barrier to ASR is that the rule of capture regime governing groundwater creates the risk that one party injects into an ASR facility could be pumped by another party.

Edwards Aquifer

The Texas Supreme Court has described the Edwards Aquifer as "a unique underground system of water-bearing formations in Central Texas." *Barshop v. Medina*, 925 S.W.2d 618, 623 (Tex. 1996). "Water enters the aquifer through the ground as surface water and rainfall and leaves the aquifer through withdrawals and springflow. The aquifer is the primary source of water for residents of the south central part of this state."

Until recently, Water Code § 27.051(i) prohibited the Texas Commission on Environmental Quality (TCEQ) from authorizing by rule or permit an injection well transecting or terminating in the Edwards Aquifer unless the injection was of: (1) groundwater withdrawn from the aquifer; or (2) storm water, flood water, or groundwater through improved sinkholes or caves located in karst topographic areas.

S.B. 1532

S.B. 1532 creates a narrow new exception that is intended to facilitate small-scale ASR and desalination research and that hints at some of the regulatory issues the state could encounter if it pursues ASR and desalination around the Edwards Aquifer on a broader scale. As a starting point, the bill reiterates the prohibition found in Section 27.051 against terminations and transections.

It then empowers TCEQ to authorize by permit three new types of injections for the portion of the aquifer that is within the geographic area circumscribed by the external boundaries of the Barton Springs-Edwards Aquifer Conservation District, but is not in that district's territory or the territory of the Edwards Aquifer Authority.

1. Injections of either: (a) concentrate from a desalination facility or (b) fresh water for ASR. The injections can transect and isolate the "saline portion" of the aquifer but must terminate in a lower aquifer. "Saline portion" is defined as the part of the aquifer that contains only groundwater with a total dissolved solids concentration of more than 1,000 milligrams per liter.
2. Injections of either: (a) concentrate from a desalination facility or (B) fresh water for ASR, provided that in both instances the wells are at least three miles from the closest Barton Springs outlet. The injections may terminate in a saline portion of the aquifer that has a total dissolved solids concentration of more than 10,000 milligrams per liter. (Simply put, the injection can pass through a part of the aquifer with 1,000 TDS but can only terminate in a part of the aquifer with ten times that amount of TDS.)
3. Injections for: (a) aquifer remediation; (b) nontoxic tracer dyes used for a hydrological study; or (c) "another beneficial activity that is designed and undertaken for the purpose of increasing protection of an underground source of drinking water from pollution or other deleterious effects." The injections may transect and/or terminate in parts of the aquifer that satisfy the territorial requirement, regardless of their salinity levels or TDS.

TCEQ can only grant permits for the second and third types of exceptions for injection wells *initially* associated with "a small-scale research project" designed to evaluate the long-term feasibility and safety of injections of desalination concentrate or ASR. ("Small-scale research project" means "one production well and one injection well that are operated on a limited scale to provide requisite scientific and engineering information"). The project findings must be shared with TCEQ and Texas State University-San Marcos.

Any injection of concentrate cannot transect the "fresh water" portion of the aquifer. ("Fresh water" is defined as water with TDS of less than 1,000 or is otherwise suitable for drinking water supply.)

To issue a permit for the injections, TCEQ must: (a) hold a public meeting; (b) require monitoring of the injection well; and (c) ensure that the injections do not result in the waste or pollution of fresh water.

Potential Impact

At this point, there is a pilot project slated for the Texas Disposal Systems in Creedmoor, in southern Travis County, but S.B. 1532 is so narrowly tailored that there are relatively few locations where injections can be made under the bill's provisions.

Still, the bill could have two types of impacts. First, it could open the door to research injection wells that eventually become commercial injection wells. Second, through "small-scale research" and through the more broadly authorized use of remediation and other "beneficial" activities, it could help to generate data and stoke the use of ASR and groundwater desalination.

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